

REMARKS

By the present amendment, claims 6 has been amended to further define the subject invention. Support for the amendments to claim 6 may be found, among others, at page 9, lines 14-19 of the subject specification. Entry of these amendments is requested.

In the Office Action, claims 6-10 were rejected under 35 USC § 103(a) as being unpatentable over the patent to Yamamoto et al in view of the patent to Uramoto et al and the newly applied patent to Hufnagel et al. In the newly formulated rejection, it was asserted that the Yamamoto et al patent teaches the subject matter of independent claim 6 with the exception of (1) the pin being surface treated and (2) the pin formed in advance into a convex shape in a part of the inner periphery of the end portion. As before, the Uramoto et al patent was then alleged to supply the former teaching deficiency (1) as well as the subject matter of the dependent claims directed to the specific composition of the pin or the surface layer. The newly applied patent to Hufnagel et al was alleged to supply the latter teaching deficiency (2). Reconsideration of this rejection in view of the above claim amendments and the following comments is respectfully requested.

Before discussing the rejection in detail, a brief review of the presently claimed invention may be quite instructive. The subject pin is a full hollow pin having a through

central hole, and an end portion of the hollow pin is caulked by a roller to connect a hub and a disk. An inner diameter portion of the end portion of the pin is only slightly deformed by roller caulking, and the deformation does not exceed an outer diameter of a shank of the pin (see FIG. 2).

However, a hard surface treated layer susceptible to breakage by caulking is formed on the surface of the hollow pin of the subject invention. As is described at page 3, line 7 to page 4, line 4 and FIG. 7 of the present specification, when a chamfered portion is formed in an inner periphery of the end portion of the surface treated hollow pin, if the chamfered portion is a linear taper shaped chamfered portion a2 to have a bending portion at the end portion, caulking pressure concentrates on the bending portion to cause breakage of the surface treated coat at the end portion of the pin.

Therefore, according to the concepts of the present invention, a convex chamfered portion is formed in part of the inner periphery of the end portion of the hollow pin. This convex chamfered portion eliminates the portion on which the caulking pressure concentrates from the inner periphery of the end portion to dissipate the caulking pressure throughout the inner periphery, thereby preventing breakage of the surface treated coat on the end portion caused by caulking. It is submitted that the cited patents to Yamamoto et al, Uramoto et al and Hufnagl et al, whether taken singly or in combination, do not teach or suggest the presently claimed invention.

More particularly, the Yamamoto et al patent discloses a pin connection structure for use in a floating type brake disc assembly. However, the Yamamoto et al patent does not disclose, among other things, a hollow pin which is formed into a convex shape in an inner periphery of the end portion. In addition, although the hollow pin defined as in claim 6 of the present application is made of a metal having a surface-treated layer, the Yamamoto et al patent fails to disclose a pin connection structure having a hollow pin made of such a layered metal.

It is submitted that the former teaching deficiency of the Yamamoto et al patent is not supplied by the newly cited patent to Hufnagl et al. The rivet according to the Hufnagl et al patent is a semi-hollow rivet having a tubular portion. A convex portion is formed in an inner periphery of an end portion of the tubular portion of the rivet. As disclosed by the Hufnagl et al patent, the semi-hollow rivet is pressed by forming dies 32 and 34 as shown in FIG. 1 so as to caulk the end portion of the tubular portion for joining two members (laminates). An inner wall 18 of the tubular portion of the rivet is inclined about 15° outwardly.

Thus, as disclosed in the Hufnagl et al patent, when caulked by the forming die 34, an inner diameter portion of the end portion of the tubular portion of the rivet can be significantly deformed outward beyond a shank of the rivet without expansion of a main

shank of the rivet. This allows a material of the end portion to be charged into the inner periphery of an inclined end portion of a hole 28 of the laminate and allow the two laminates to be firmly joined.

From the above description, the presently claimed pin is significantly different from that taught by the Hufnagl et al patent in both the object to be caulked and the type of caulking. The rivet of the Hufnagl et al patent is solid except a caulking portion. Thus, press caulking which causes large deformation allows the material of the rivet to be charged into the inner periphery of the inclined end portion of the hole of the laminate to join the two laminates. In distinct contrast, with the full hollow pin according to the presently claimed invention, pressing the end portion of the hollow pin by a forming die causes the material of the pin to move to the hollow portion, which prevents press caulking of the end portion.

In addition, the press caulking of the Hufnagl et al causes significant extension of the rivet material. Thus, if the rivet of the Hufnagl et al patent is surface treated, the extension of the material by caulking causes breakage of the coating of a surface treated layer, which may lead to exposure of a rivet material surface under the coating.

While a convex portion is shown to be formed on the inner periphery of the end portion of the tubular portion of the rivet of the Hufnagl et al patent, the patent fails to

describe the convex portion. Furthermore, the Hufnagl et al patent fails to teach or suggest prevention of damage on the end portion of the rivet caused by press caulking.

Unlike the present invention, the Hufnagl et al patent fails to disclose or suggest the technical concept that the inner periphery of the end portion of the hollow pin is formed into the convex shape to eliminate the portion on which the caulking pressure concentrates from the inner periphery of the end portion, thus preventing breakage of the surface treated coat of the end portion. The structure of the semi-hollow rivet of the Hufnagl et al patent is characterized by press caulking, and it is not obvious from the Hufnagl et al patent that the shape of the inner periphery of the end portion of the rivet is applied to the hollow pin by roller caulking to prevent breakage of the surface treated coat of the end portion of the hollow pin. As a consequence, those of ordinary skill in the art would not be readily able to achieve the presently claimed invention therefrom.

It is submitted that the latter teaching deficiency of the Yamamoto et al patent is not supplied by the patent to Uramoto et al. The Uramoto et al patent relates to organic surface treatment for preventing rust and corrosion and does not relate to the metal surface treatment for preventing corrosion according to the present invention. The Uramoto et al patent fails to describe breakage of a surface treated coat caused by caulking an end portion of a pin. Thus, those skilled in the art cannot easily achieve the present invention by combining the hollow pin of the patent to Yamamoto et al with the

surface treatment according to the patent to Uramoto et al, and forming in advance the convex shape in the inner periphery of the end portion of the rivet of the Hufnagl et al patent.

Regarding the combination of the Yamamoto et al patent with the Uramoto et al and Hufnagl et al patents, it is submitted that the cited patents provide no suggestion to motivate one of ordinary skill in the art to combine their teachings in the manner proposed by the examiner. As is well settled, obviousness under Section 103 of the statute requires a teaching or suggestion in the art to combine the teachings of the patents as proposed by the examiner with the expectation that the results achieved would have been predicted by that person of ordinary skill. The patents provide no suggestion to motivate one of ordinary skill in the art to combine their teachings in the manner proposed. Without such a suggestion, any combination is pure speculation on the part of the examiner and is based on a prohibited hindsight reconstruction from applicants' own disclosure.

For the reasons stated above, withdrawal of the rejection under 35 U.S.C. § 103 and allowance of claims 6 through 10 as amended over the cited patents are respectfully requested.

In view of the foregoing, it is submitted that the subject application is now in condition for allowance and early notice to that effect is earnestly solicited.

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In the event this paper is not timely filed, the undersigned hereby petitions for an appropriate extension of time. The fee for this extension may be charged to Deposit Account No. 01-2340, along with any other additional fees which may be required with respect to this paper.

Respectfully submitted,

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